

Problem Based Learning for Quality Teacher Education

Theme: Formal Education

Sub-Theme 4: Revamping Teacher Education

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INTRODUCTION

Teachers are potentially the single most important asset in the achievement of the vision of a learning society. The modern day teacher should be prepared to take on roles of not just knowledge disseminators but also knowledge creators, and knowledge managers. The National Curricular Framework (NCERT, 2005) expects teachers to 'play a more active role in relation to the process of knowledge construction in which children are engaged'. Teachers therefore ought to be trained in using their own individual learning curricula as a means of generating and regenerating the understandings, critical thinking skills, emotional intelligence, craft skills and intellectual flexibility to be committed to life long learning.

Teacher education courses will have a responsibility, to develop the higher order thinking and decision-making skills of their own student-teachers - skills that are becoming widely accepted as necessary for lifelong learning. Teacher Education is faced with many challenges, some of which are;

- A wide gap between theory and practice (Nagpal, 2000)
- Use of didactic approaches for instruction, especially the lecture method that has limited scope in developing professional skills (Griffin C., 2002)
- Dearth of tried and tested approaches that would help in the development of pedagogical judgment in student teachers, besides pedagogical skills and make them 'reflective practitioners'(Schon, 1983 cited in Day C., 2003)

There should be an emphasis on experiential and self directed learning. Teacher education should focus on learning 'which combines knowledge with understanding' and which requires encouraging aspiring teachers to work with 'surface learning (knowledge components or facts) and deep learning (connections, relationships, holistic understanding)'. (Svingby 1993, cited in Day C., 2003). Just as classrooms must be learning environments in which pupils receive, respond to and actively participate in generating knowledge, so professional development opportunities must provide a range of learning experiences which encourage teachers to reflect upon and inquire into their thinking and practice through interaction between their own and others' experience, so that they are able to embrace the challenge of new teaching roles and see these as challenges rather than burdens to be borne. One of the approaches that serves to meet the challenges of teacher education is Problem Based Learning.

Problem Based Learning

Problem based Learning is a curriculum development and instructional approach that recognizes the need to develop problem solving skills as well as the necessity of helping students to acquire necessary knowledge and skills. Torp and Sage (1998) described PBL as focused, experiential learning organized around the investigation and resolution of messy, real world problems. They describe students as engaged problem solvers, seeking to identify the root problems and the conditions needed for a good solution and in the process becoming self directed learners. Hmelo-Silver (2004) described PBL as an instructional method in which students learn through facilitated problem solving that centers on a complex problem that does not have a single correct answer. She noted that the students work in collaborative groups to identify what they need to learn in order to solve a problem, engage in self directed learning, apply their new knowledge to the

problem, and reflect on what they learned and the effectiveness of the strategies employed.

The PBL approach has been advocated by many higher education specialists since it encourages students to take a 'deeper approach' to learning. Another pedagogical reason for the use of PBL is that this method, with its emphasis on collaborative inquiry, should strengthen the links between teaching and research (Spronken-Smith, 2005). The strengthening of these links is beneficial for undergraduate university education.

Metacognition

In order to acquire knowledge it is imperative to think; not only about information but also about one's own thinking patterns and processes. This stresses the importance of metacognition in constructing and reconstructing mental models that are key processes in learning. Cognition means knowing, while metacognition implies a self-conscious awareness about how one learns. It can further be defined as what we know about our cognitive processes in order to learn and remember (Ormrod, 2004). According to Flavell (1979), metacognition is composed of both metacognitive knowledge and metacognitive regulation.

The study of metacognition holds several implications for instructional interventions, such as teaching students how to be more aware of their learning processes and products as well as how to regulate those processes for more effective learning. The task of educators is to acknowledge, cultivate, exploit and enhance the metacognitive capabilities of all learners. Metacognition, or awareness of the process of learning, is a critical ingredient to successful learning.

STATEMENT OF THE PROBLEM INVESTIGATED

A Study of the Effectiveness of Problem based Learning in developing Metacognitive skills in Student teachers.

OBJECTIVES

The following objectives were framed for the study;

- To study the effectiveness of Problem based Learning strategy in developing Metacognitive skills of student teachers.
- To study the effect of the Problem Based Learning strategy on the scholastic achievement of student teachers.

HYPOTHESES

The following null hypotheses were framed for the study:

1. There will be no significant difference in the Metacognitive skills of student teachers developed through Problem based Learning and the traditional strategies.
2. There will be no significant difference in the scholastic achievement of student teachers when taught through Problem based Learning and the traditional strategies.

METHODOLOGY

The Experimental Method was adopted for the present study. The pretest posttest equivalent group design was used, to study the effect of the Independent variable on the Dependent variables.

VARIABLES

The Variables in the study were as follows:

Independent Variable:

- Problem based Learning.

Dependent Variables:

- Achievement
- Metacognitive Skills: This involves the following aspects:
 - a) Knowledge about Cognition
 - Declarative Knowledge
 - Conditional Knowledge
 - Procedural Knowledge
 - b) Regulation of Cognition.
 - Planning
 - Information Management Strategies
 - Comprehension Monitoring
 - Debugging Strategies
 - Evaluation

SAMPLE

64 student teachers from two Teacher education Institutions were used for the study. Thirty two students from each college of education were the final participants in the study. The technique of sampling used in the selection of colleges of education was purposive. The students' sample was derived after the pretest on the Metacognitive Awareness Inventory (MAI). The two groups were equalized on the basis of their scores on the MAI.

TOOLS

On the basis of the Research problem and the variables identified the investigator prepared an Achievement Test and used a Metacognitive Awareness Inventory prepared by Schraw and Dennison in 1994. Thus the tools used for the study were;

- Metacognitive Awareness Inventory (Schraw and Dennison-1994)
- Achievement Test on the topics of Cognitive Development and Moral Development.

DEVELOPMENT OF THE PBL PACKAGE

In order to study the effect of PBL on the dependent variables it was essential to design and develop the PBL package using an appropriate strategy for Instructional Designing. The **ADDIE Analysis-Design-Development-Implementation-Evaluation** Model was used to design and develop the package. A PBL Package was initially made for the Pilot group. This helped the Investigator to develop the PBL Package for the main study.

STATISTICAL TECHNIQUES

The data gathered was subjected to Descriptive and Inferential analysis.

The statistical analyses used for the study are as follows;

- Descriptive: Mean, Standard Deviation, Skewness and Kurtosis.
- Inferential: t-test and Analysis of Co-variance (ANCOVA). t-test was used to compare the means of the Experimental and Control groups on their Metacognitive Awareness and its various aspects. ANCOVA was used to compare the means of the Experimental and Control groups on their Achievement tests, as the groups had not been equated on their Achievement scores.

FINDINGS

It was found that

- 1) The Experimental Group performed significantly better than the Control Group on the aspect of Procedural Knowledge, though on the whole there is no significant difference in the two groups on the Knowledge of Cognition.
- 2) The Experimental Group performed significantly better than the Control Group on Regulation of Cognition and two of its aspects namely Planning and Information Management.
- 3) The Experimental Group performed significantly better than the Control Group on the Total Metacognitive Awareness.
- 4) The Experimental Group performed significantly better than the Control Group on the Achievement Test.

DISCUSSION

The analyses have shown that Problem Based Learning positively influences the Metacognitive Awareness as well as the Achievement of the student teachers. The present study shows that Problem based Learning scores over traditional approaches in the development of Metacognitive skills and learning. The experiential process of PBL requires the learners to organize, plan, monitor their comprehension and also manage the vast store of information related to the problem. It thereby equips the learners with Procedural knowledge, as is reflected in the study. This implies that through PBL, the student teachers realized how to implement learning procedures in various situations. They also became adept at obtaining knowledge through discovery, co-operative learning and problem solving. As Raman A. (2002) pointed out, 'PBL builds on the excitement that arises out of a sense of discovery.'

The study also reflects how PBL equips students with the metacognitive skills, namely, Planning and Information Management that are needed to be self directed learners. The students set goals and plan their learning process and then through constant reflection of the types mentioned earlier, they obtain and process the information more efficiently using skills such as organizing, elaborating, summarizing and selective focusing. The significant difference in Regulation of Cognition indicates that the student teachers developed self-monitoring skills. This implies that by the end of the PBL process, the student teachers acquired the ability to consciously adapt and manage their thinking strategies during problem solving and purposeful thinking. The significant influence of PBL on the scholastic achievement of student teachers shows that it develops the metacognitive skills without any compromise on learning. It is thus a strategy that ought to be incorporated in teacher preparation courses.

The practice of PBL in colleges of education would bring about a revamping of the following aspects;

Teaching Methods

The PBL tutorials follow four phases namely

- Engagement – Students become interested in problem situation and begin posing questions that lead to investigation.
- Investigation – Students explore problem to extend their knowledge & skills. Toward the end of this phase, they frame a problem statement.
- Resolution – Students make a decision with regard to a solution and decide how best to represent their solution.
- Debriefing – Students step outside problem to reflect and generalize both content and process.

Curriculum Design

PBL necessitates a multidisciplinary approach in order to have a complete and comprehensive

understanding of the problem at hand. Thus the application of PBL would make learning more holistic.

Role of teacher educators

Teacher educators would become tutors, whose responsibilities would include;

- Selection of compelling cases, those are appropriate to the programme goals and learners' needs.
- Selection of appropriate resources to approach the problem.
- Explaining the PBL process and its rationale.
- Clarifying individual learner roles and group roles and discussing how the groups were expected to make decisions.
- Helping the student teachers elicit and identify significant facts in the problems and generate hypotheses, ideas and issues.
- Encouraging student teachers to identify and share what they already know, that would help them to identify the learning issues.
- Helping the student teachers to prioritize the learning issues.
- Promoting an attitude of helping one another to build a collaborative environment.
- Insisting on Reflection and Planning.
- Encouraging a risk taking attitude.
- Monitoring and facilitating the flow of sessions.
- Encourage time management.
- Encouraging participative decision making.
- Maintaining Socratic dialogue with the student teachers, and encouraging students to raise pertinent questions.

Assessment Techniques

With multiple purposes for problem based learning, it is important to consider a variety of evaluation techniques such as, Written examination, Practical examinations, Concept maps, Peer assessments, Self assessment, Facilitators/tutor assessment, Oral Presentations, Written Reports.

CONCLUSION

PBL would bring about not only conceptual learning through cognition but also self-knowledge through metacognition. As Kolb (1984 cited in Olson D.R., 2001) said "Learning is the process whereby knowledge is created through the transformation of experience. Teaching through PBL would make the future teachers learn from their experiences and create or modify experiences, thus making them experiential learners and reflective practitioners. PBL could thus be used to bridge the gap between the theory and practice of teacher education. In order to find meaning in the theories of education the pre-service teachers ought to work with problem situations that would help make their learning more holistic. It is therefore recommended that teacher education colleges should work towards institutionalization of Problem Based Learning.

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